We want to make sure that younger officers coming up through the ranks understand the value of S&T and understand that it is essential to make those long-term investments.

Secretary of the Navy Winter made an interesting comment that we all should be looking at what we are going to need in the future and not just continue to train the same types of people. A good example is information systems. Fifteen or 20 years ago we were not thinking much about hiring people who had expertise in information systems and networking.

CHIPS: In your role, do you engage with warfighters?

Dr. Gruber: My closest ties to the operational fleet are the ONR Global Science Advisors and the warfare centers. The warfare centers understand the S&T. They have the Navy perspective — a unique perspective that I cannot find at universities. The naval warfare centers are a national asset.

CHIPS: Do you have any concerns about the next generation of scientists and engineers?

Dr. Gruber: There is no doubt that we are seeing fewer and fewer American students choosing to go into science and engineering. However, I am an optimist. I think that trend will reverse. Before I came here, I was on campus at Penn State. Even though I did not teach, I interacted with students, and I noticed that students these days are much more savvy consumers than I was when I went to college.

I went into physics because I liked it in high school, and I thought it would be neat. I was not thinking about what kind of job I was going to get or where my job opportunities were going to be. Now students want to know what their return on investment is going to be. In recent history, the opportunity and the dollars have been in business and sports-related fields. It is supply and demand.

At Penn State, I was mentoring a freshman in materials science and I told her to do whatever she could to stay in a technology field. In the not too distant future the baby boomers are going to start retiring, and people are going to be clamoring for young professionals with technical skills. You will see that pendulum start to swing when they realize that there are significant opportunities in science and engineering.

The challenge that the Chief of Naval Research and I have decided to take on with our education and outreach is not to try to solve the problem with the shortage of scientists and engineers in the United States. Instead, we want to get those graduates that are coming out in science and engineering fields to be interested in working on Navy problems or working for the Navy.

We have to inform students about the great career options in science and engineering. I had my Ph.D. funded by ONR, and I went on to work on Navy problems.

Dr. Gruber's biography is available at http://www.onr.navy.mil/about/docs/gruber_patricia_2006.pdf. CHIPS

DNA-Biopolymer Photonics Program

By U.S. Air Force Lt . Col. Torsten Rhode

New and significant contributions have recently been made to the area of bioengineering. Dr. James G. Grote, from the Air Force Research Laboratory (AFRL), has been leading a team from around the world in investigating a new class of polymer, based on DNA derived from natural byproducts of the fish hatchery industry.

Contributions, like those made by researcher Lt. j.g. Kathleen Mandell, Ph.D., through a partnership with the AFRL and the Office of Naval Research Joint Science and Technology Reserve Project, and with the support of Dr. Frances Ligler, senior scientist for biosensors and biomaterials at the Naval Research Laboratory's Center for Bio/Molecular Science and Engineering (CBMSE), have helped the team develop the new biopolymer into a material which possesses unique optical and electromagnetic properties that no other known polymer has.

These include high and tunable conductivity and ultra low optical and microwave loss. Electronic and electro-optic devices fabricated from this new biopolymer have also demonstrated performance that exceeds the performance of the state-of-the-art devices fabricated from current organic-based materials.

Biopolymers may be the "silicon" of tomorrow's polymers, with a potential impact on a wide spectrum of both electronic and optoelectronic devices, while at the same time being inexpensive and easy to process. Where silicon is today's fundamental building block of inorganic electronics and photonics, biopolymers hold promise for tomorrow's fundamental building block for organic electronics and photonics.

This is significant because it demonstrates that biotechnology is not only applicable for genomic sequencing and clinical diagnosis and treatment, but can also have a major impact on non-traditional biotech applications as well, opening up a whole new field for bioengineering. CHIPS

Lt. j.g. Kathleen Mandell conducting tests on a DNA biopolymer specimen.